



LOTOS Group  
Integrated Annual Report 2016

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## OUR STRATEGY

Our strategy > Value Creation Model

## Value Creation Model

- The values we create bring benefits not only to the LOTOS Group but also to its many stakeholders.
- All the segments comprising our value chain are profitable.

The LOTOS Group's Value Creation Model has been founded on thorough, realistic analyses and long-term forecasts of the global oil market, and therefore should ensure stable and secure growth of the LOTOS Group in 2017–2022.

A full description of our business model is available in an interactive form on our Integrated Report: <http://2016.raportroczny.lotos.pl/en/our-strategy/value-creation-model>

# Long-term prospects for the LOTOS Group's expansion

## Key opportunities and challenges in the long term

According to long-term projections, demand for fuel will grow in Central and Eastern Europe and continue to weaken in Western Europe – by 14% by 2030. As a whole, Europe is forecast to see stronger demand for aviation fuels and a decline in demand for gasoline. Concurrently, under the EU climate policy, refineries will be required to adopt solutions to reduce CO<sub>2</sub> and other greenhouse gas emissions and to step up the use of renewables.

### Key long - term market opportunities and challenges



#### Major changes in the mix of energy sources and environmental policy

- o Shift in the structure of fuel demand
- o Shale gas revolution
- o EU's climate policy

#### Accelerating advances in technology

- o Electric and hybrid vehicles
- o Industry 4.0
- o Weakening demand for oil products in EU (energy efficiency)

#### Growing competition on dynamic market

- o New refining capacities in Middle East and Asia
- o Change in the oil products import and export directions – US as an oil & gas exporter

#### Poland's energy security

- o Own energy sources
- o Diversified supply directions
- o Flexibility in procurement

## Major changes in the mix of energy sources and environmental policy:

### Shift in the structure of fuel demand

By 2021, global demand for fuel is expected to grow by 5 mboe/d (to 100.6 boe/d), despite a 0.4 mboe/d decline in Europe. Across Europe, gasoline consumption will decrease by 13%, while demand for jet fuel and diesel oil will rise by 10% and 3%, respectively.

### Shale gas revolution

In the U.S., upstream companies have been deploying increasingly more advanced and cost-effective shale oil production technologies, thus also reducing servicing costs. This has resulted in greater output of natural gas and crude oil and has allowed the U.S. to reduce its dependence on imported energy commodities and to develop energy-intensive industries.

## **EU's climate policy**

The EU has proposed to introduce more stringent climate protection regulations by 2030. They will provide for further cuts in CO<sub>2</sub> and other greenhouse gas emissions and for an increased share of renewables in the energy mix. Highly efficient and technologically advanced, the Gdańsk refinery is well braced for these changes.

## **Accelerating advances in technology:**

### **Electric and hybrid vehicles**

The intensive development in the area of hybrid and electric vehicles is one of the key factors to contribute to the projected decline in demand for liquid fuels.

### **Industry 4.0**

Modern technologies, e.g. advanced analytics, big data, automation, robotics or 3D printing, are becoming increasingly widespread in today's industry. They are applied to enhance production efficiency and reduce costs, with complex and large-scale production processes appearing to benefit the most from the fourth industrial revolution.

### **Weakening demand for oil products in EU – energy efficiency**

Efficiency measures taken in Western Europe will also slow the growth of demand for fuels in Central and Eastern Europe. However, it is the still growing CEE market that is considered to be promising in the coming years. By 2025, it is forecast to see a 4% increase in demand for transport fuels (gasoline, diesel oil, light heating oil).

## **Growing competition on dynamic market:**

### **New refining capacities in the Middle East and Asia**

To diversify their operations and expand their value chain, Middle East countries are building new refining capacities which will increase competition in the global refining market in the future.

### **Change in the oil products import and export directions – The US as an oil & gas exporter**

Recent years have seen major changes in oil imports and export directions. In the wake of the shale revolution, the U.S. has become a major player in the global energy sector. An importer has turned into an exporter. For the Middle East, this necessitates search for new export directions, which in turn renders the European market more appealing to oil producers (given its geographical proximity). In addition, with the lifting of international sanctions, Iran has returned to the global market as an exporter of oil to various regions, including in particular India, China and Europe (together with the U.S., these three account for half of the global oil demand).

## Poland's energy security:

### **Own energy sources**

Expansion of the production segment (LOTOS Petrobaltic) through diversification of the current upstream portfolio and purchase of new upstream assets (including in new, though stable, geographic locations) creates an opportunity to enhance the segment's efficiency. Potential risks include the scale of the upstream sector on the one hand (globally, LOTOS is considered a minor player) and considerable uncertainty as to oil prices in the future on the other (especially in the context of the U.S. shale revolution and the development of new engine technologies).

### **Supply chain diversification and flexibility in feedstock procurement**

With access to a seaport, the LOTOS Group is able to adopt a flexible approach and purchase a wide range of oil grades from across the world. Our state-of-the-art refinery is characterised by great flexibility in processing of crude oil. This enables us to take advantage of the current market conditions and buy crude at competitive prices, and consequently to reduce our largest cost item. The risk lies in maintaining operating efficiency – frequent changes in the composition of feedstock require a thorough knowledge of refining facilities and of the market, as well as quick verification of suppliers.

Our strategy > Value Creation Model > How our model works

## How our model works

The LOTOS Group's business is divided into **three segments** which together **comprise a complete value chain** – from exploration to sales of finished products.

### 1. Crude oil and natural gas exploration and production / Upstream segment

Exploration and production operations carried out by the Company allow it to diversify revenue and optimise total margins while reducing its dependence on business cycles in each market segment. The acquisition of new production licenses is aimed at improving our competitive edge.

**The LOTOS Group produces crude oil and natural gas from the following sources:**

- From **Polish** fields – crude oil with a small proportion of associated gas,
- From **Lithuanian** fields – crude oil,
- From **Norwegian** fields – gas and condensate (i.e. light crude), with natural gas predominating in the output mix.

#### Why are our production operations efficient?

- We can boast a thorough knowledge of the geographical region of the Baltic Sea Shelf and Norwegian Continental Shelf.
- We are highly competent in drilling and exploration work.
- We have the expertise and status of an operator.
- We are partners with strong and experienced players with international presence.

#### More information

[Directors' Report on the operations of Grupa LOTOS S.A. and the LOTOS Group in 2016](#)

Chapter 4.1. Upstream segment and 4.4.1. Upstream segment's logistics

### 2. Refining operations/Refining segment

Operations in this segment start with the processing of the extracted hydrocarbons into a semi-product ready for further processing. This marks a key phase in the transformation of manufacturing capital, after which the Company has a marketable product. Our refinery, with the annual processing capacity of approximately 10.5m tonnes of crude oil, is one of the most advanced and youngest refineries in Europe.

### Why are our refining operations efficient?

- We operate state-of-the-art and technologically advanced production units located in one of the most modern European refineries with the annual processing capacity of approximately 10.5m tonnes of crude oil.
- We rank first in Poland and high in Europe in terms of the Nelson Complexity Index (crude oil processing complexity ratio).
- With our refinery's technological configuration, coupled with its location advantages, we enjoy significant flexibility in selecting oil grades. This makes it possible to smoothly adapt the production volumes for individual finished product groups to the domestic demand and export opportunities.

#### More information

[Directors' Report on the operations of Grupa LOTOS S.A. and the LOTOS Group in 2016](#)

Chapter 4.2. Downstream segment – crude oil refining

## 3. Sales and logistics / Marketing segment

The LOTOS Group markets its products in Poland (sales to foreign companies operating in the country) and on foreign markets (exports by sea and by land). LOTOS Group companies target their sales at individual sectors, i.e. fuels, lubricants, and bitumens. Products of the LOTOS Group are available in Poland and abroad. Engine oils are sold in 45 countries. The Company is among the leaders in the domestic market of road bitumens.

### Why are our marketing operations efficient?

- The LOTOS Group manages a chain of 487 conveniently located service stations all over the country.
- We are the leader of the promising MSA market; our service station chain includes 17 Motorway Service Areas along the A1, A2, A4 and A6 motorways, as well as S3 and S7 expressways.

#### More information

[Directors' Report on the operations of Grupa LOTOS S.A. and the LOTOS Group in 2016](#)

Chapter 4.3. Downstream segment – crude oil refining and 4.4.2. Downstream segment's logistics

There are three phases in the operation of our value chain, which can be matched to the business segments: upstream, refining and marketing:

- **Creating value** – performed through the "oil and gas exploration and production" phase in the upstream segment;

- **Adding value** – performed through the "refining and marketing" phase in the refining and marketing segments;
- **Making a return** on investments, known as 'monetising' – performed through the "sales and logistics" phase in the marketing segment.

Our strategy > The LOTOS Group's growth strategy

## The LOTOS Group's growth strategy

→ Our vision is to grow in a stable and sustainable manner. We intend to achieve this by implementing the growth strategy for 2017–2022.

[Presentation of the LOTOS Group Strategy for 2017-2022](#) 

Our strategy > The LOTOS Group's growth strategy > 2016: work on the LOTOS Group's strategy

## 2016: work on the LOTOS Group's strategy

In 2016, Grupa LOTOS carried out extensive analyses to develop a strategic plan for 2017–2022. The Supervisory Board actively participated in the development of the new strategy: nine panel sessions with the Board were organised, devoted to defining strategic objectives.

The strategy development began with identifying growth directions and analysing the LOTOS Group's current assets. In this way we identified the directions and assets that offer prospects/opportunities for value creation in the next five years.

Work on the 2017–2022 strategy was guided by the following objectives:

- Resumption of regular dividend payments
- Sustainable and effective development of complementary business segments
- Integrated margin optimisation
- Poland's energy security, supported by diversified sources of raw materials.

The strategy has been widely consulted throughout the LOTOS Group during numerous meetings with the management and employees of the LOTOS Group companies. The Controlling Team contributed strongly to the final document by building a financial model that enabled simulation of various macroeconomic scenarios, definition of strategic paths for strategic KPIs, and detailed allocation of objectives to the LOTOS Group's individual business segments.

### More information

[Directors' Report on the operations of Grupa LOTOS S.A. and the LOTOS Group in 2016](#)

Chapter 2.3. Stability and sustainable growth – LOTOS Group Strategy 2017–2022

Chapter 2.1. Summary of execution of the 2011–2015 strategy

## We are lengthening the value chain

For the LOTOS Group, 2016 was a time of hard work not only on the new strategy, but also on the development of products and services which would build the Company's competitive edge in the long term. The expertise gained during product development supported the ongoing work on the LOTOS Group's strategy for the next five years. As a result, the following new projects were carried out at the LOTOS Group companies in 2016:

- The LOTOS Group expanded the pool of global customers. LOTOS-Air BP started deliveries of aviation fuel to Emirates Airline and Air China.
- LOTOS Paliwa introduced non-fuel services and products at its service stations, together with a dedicated sales model. Those initiatives translated into a record high performance in 2016 in terms of retail fuel sales, with LOTOS Paliwa's adjusted EBITDA for 2016 reaching PLN 156m.

- LOTOS Kolej opened its new, sixth Transport Division in Poznań, which is used to develop its services in Germany.
- LOTOS Kolej started to transport grains and fodder after it had been certified for compliance with the GMP+ B4 standard. The company operates its own new rail cars.

Our strategy > The LOTOS Group's growth strategy > Ambitious targets – twofold growth of EBITDA

## Ambitious targets – twofold growth of EBITDA

### Presentation of the growth strategy for 2017–2022 (EBITDA to double in 2019–2022)

One of the objectives of the LOTOS Group's strategy for 2017–2022 is to stabilise the LOTOS Group's performance on the difficult oil market, and to maintain stable and sustainable growth in the following key business areas:

- Exploration and production,
- Manufacturing highest-quality fuels,
- Maintaining emergency stocks to build Poland's energy security,
- Technological advancement of the refinery and implementation of innovations.

In 2019–2022, we intend to double our LIFO-based EBITDA, from about PLN 2bn in 2015–2017 **to some PLN 4bn**. We plan to allocate PLN 9.4bn to capital expenditure until 2022.

Capital expenditure will be made in line with a detailed action plan, which for the next two years (2017–2018) provides for focusing on the development of the **B8 field** and the completion of the **EFRA Project**. We will also put emphasis on supporting innovation implementation processes.

### Our strategy – five objectives

The LOTOS Group's strategic objectives for 2017–2022 are:

#### Effective use of assets along the value chain.

Meaning: use of production licences, further optimisation of refining technologies, new products and alternative fuels.

- 1.1. New, safer concept for developing a balanced upstream portfolio
- 1.2. Competitive edge with innovative technologies and new products
- 1.3. LOTOS Energy Hub in retail and care to ensure high standards in quality

#### Processes which guarantee stability.

Meaning: consistent and repeatable reduction of operating expenses and optimisation of margins along the value chain

- 2.1. Increased resilience to adverse external conditions thanks to low costs

- 2.2. Excellence in integrated margin management and diversification of feedstock sources

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**Readiness to embrace innovation.**

Supported by: dedicated funds, a new model of collaboration with research centres, and real use of our employees' potential.

- 3.1. Setting up a fund to finance implementation of growth projects
- 3.2. Use of own experts and infrastructure to create a new research and development model in partnership with research institutions

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**Active opportunity and risk management.**

Meaning: greater flexibility in responding to risks and faster identification of business opportunities.

- 4.1. Strong culture of open dialogue and early response to risk symptoms
- 4.2. Risk management to optimise value for stakeholders

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**Strong team, coherent CSR story and safety.**

Meaning: greater responsibility for the wider environment. Building national energy security, diversifying supplies of raw materials and fuels, OHS, cyber security and social responsibility.

- 5.1. Talent development as a key source of competitive advantage
- 5.2. Integrated CSR policy
- 5.3. Robust safety culture

**More information**

[Directors' Report on the operations of Grupa LOTOS S.A. and the LOTOS Group in 2016](#)

Chapter 1.3. Corporate Social Responsibility

Chapter 2.4. [CORPORATE SOCIAL RESPONSIBILITY strategy](#)

Our strategy > The LOTOS Group's growth strategy > Risks related to the LOTOS Group's strategy

## Risks related to the LOTOS Group's strategy

The key material risks that may affect the LOTOS Group's strategy implementation include:

**Macroeconomic risk** – the risk of changes in the macroeconomic environment, including oil prices, foreign exchange rates, crack spreads on refining products, and growth of Poland's GDP. Adverse developments of any of these can significantly affect the feasibility of achieving our financial targets:

- **Oil prices affect the LOTOS Group's largest cost category.** In the past, oil prices were negatively correlated with refining margins.
- **Exchange rate movements** (in particular, the USD/PLN exchange rate) are important because a large part of our cost base is denominated in USD, while revenue (from fuel sales in Poland) is generated in PLN.
- Changes in **crack spreads on refining products** may have a material adverse effect on our revenue in the worst-case scenario.
- A significant decline or slowdown of **Poland's GDP** would directly affect the demand for the LOTOS Group's products and its revenue.

**Risk of a delay in the execution of key projects** – the LOTOS Group is currently implementing a number of key projects, such as EFRA, B4B6, B8, YME, FGD and Langfjellet, whose impact on EBITDA is estimated at tens or hundreds of millions of Polish złoty. Any significant delay in the execution of those projects would have a tangible impact on the achievement of our strategic objectives (in particular EBITDA or CAPEX).

### More information

[Directors' Report on the operations of Grupa LOTOS S.A. and the LOTOS Group in 2016](#)

Chapter 7.4. Material agreements and court proceedings in 2016



LOTOS Group  
Integrated Annual Report 2016

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# READINESS TO EMBRACE INNOVATION

Readiness to embrace innovation > Innovation Our approach

## Innovation Our approach



**THE GLOBAL GOALS**  
For Sustainable Development



### Our approach to innovation:

- Makes innovative projects **an integral part of all investment projects.**
- Seeks synergies between the needs of the company and benefits to the environment, especially to the natural world. The **technologies we use are ahead of the increasingly stringent environmental protection** standards and regulations.
- Is based on the assumption that **there is no single pattern of innovation-driven operations** in the refining industry, therefore each company, including the LOTOS Group, seeks its own way. We do not merely rely on the manufacturer's knowledge but we also **develop proprietary solutions.**
- Takes into account the fact that growth of the refining business requires application of state-of-the-art technologies and systemic solutions in the organisation's structure.
- Results in a regular analysis of new technologies with a view to **improving them to meet refinery's needs.**
- **Uses synergies between various industries.** We collaborate with other businesses in creating innovations.
- Recognises the fact that innovative projects **bolster our competitiveness.** That is why we have assigned strategic importance to their development and implementation and made them a foundation for one of the five objectives in the LOTOS Group's strategy for 2017–2022.

Readiness to embrace innovation > Innovation Our approach > We invest in state-of-the-art technologies

## We invest in state-of-the-art technologies

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### Deep oil processing technologies

Our innovative projects completed so far focused on developing technologies for manufacturing products which ensure higher margins on the processing of crude oil. However, sales volumes of those products are smaller than our output of fuels and range from a few to a few dozen thousand tonnes per year.

Therefore in 2016, as in the previous year, as part of the EFRA Project we invested in cutting-edge deep oil processing technologies to increase our production of high-quality fuels.

Advantages to be gained by the LOTOS Group following completion of the EFRA Project:

- Our refinery will be able to add heavier (and thus cheaper) crudes from, e.g. Canada or Venezuela, to its feedstock mix.
- They will be processed into the highest quality fuels and coke that will be used in power generation.
- A unique solution will be applied at the DCU (the main component of the EFRA process line), which will make the Gdańsk refinery one of the most environmentally-friendly refineries in the world. An innovative Triplan technology used as part of the EFRA Project will make the DCU – globally considered to be a unit with a harmful impact on the environment - at our refinery a completely enclosed system.
- As early as in 2018 Grupa LOTOS will increase its volumes of high-margin products.

### Phasing out unprofitable and environmentally unfriendly products

#### EFRA The end of heavy fuel oil

The main objective of EFRA is to ensure a more efficient use of heavy residue, which is the heavy end of crude oil now used to make heavy fuel oil or bitumens. When the project works are completed and the new units come on stream, each tonne of heavy residue will be processed into some 700 kg of fuels and 300 kg of coke. As part of the EFRA Project, as of 2018 the LOTOS Group will phase out heavy fuel oil from the production process as it yields negative margin and is not environmentally friendly.

## UCOPure – purified oil

The UCOPure project, implemented by Grupa LOTOS in a consortium with Polymemtech Sp. z o.o., focuses on developing a new technology for processing unreacted oil from hydrocracking. **The aim of the project is to develop a new, world-class innovative technology making it possible to earn higher margins** by treating the unreacted oil stream into a product of much higher quality, which will be converted in further stages of the production process into main refinery products such as fuels.

- **UCOPure** is the only technology in the world that employs integrated **filtration** to remove **PAH** – heavy polycyclic aromatic hydrocarbons from unreacted oil from hydrocracking, and involves development and preparation of membranes and filtration systems used in the process.

The project is co-financed by the National Centre for Research and Development under the INNOCHEM sectoral programme. The consortium of Grupa LOTOS and PolymemTech Sp. z o.o. came fifth in the INNOCHEM competition, having scored 20 out of 22 points to be won.

## Durable bitumens – MODBIT HiMA

In 2016, LOTOS Asphalt developed and commercialised **highly polymer-modified bitumens** – MODBIT HiMA.

- ➔ Such bitumens are used in the construction and maintenance of roads, airports and other hard surfaces.
- ➔ They are recommended for bitumen-aggregate mixtures used in highly durable layers of perpetual pavements which require > **high resistance to aging** > **resistance to fatigue and low-temperature cracking** > **and resistance to rutting**.
- ➔ The content of SBS 25/55-80, 45/80-80, and 65/105-80 polymers in those bitumens **is more than double that in modified bitumens** typically used in the wearing course of roads.

Readiness to embrace innovation > Innovation Our approach > Investing in efficiency

## Investing in efficiency

→ In 2016, a blending online system for blending fuels was introduced at the Gdańsk refinery. The project increased the refinery's output and reduced its energy intensity.

### How we reduce the refinery's energy intensity and costs – innovation in 2016

At the LOTOS Group we are consistently investing in technologies reducing energy intensity, which makes our business more environmentally friendly and economically efficient.

#### New blender – online fuel blending

In 2016, in order to further improve the efficiency of our refinery's production processes we launched a **new innovative blender** for blending gasoline and diesel oil. The project to upgrade and extend the existing unit was designed by the LOTOS Group engineers.

Blender is a system designed to blend fuels **online, i.e. in the pipelines**, which supplements the traditional method where all the components are blended in tanks. Online blending is a **key functionality of a modern and smart refinery**.

Completion of the investment project increased our production efficiency through:

- Diversifying the methods of product blending,
- Facilitating adaptation to changes in the refinery operation,
- Reducing the time for blending a batch by half,
- Reducing the number of re-blends,
- Automating the blending process.

The scope of product quality checks will increase, too.

Readiness to embrace innovation > Creative employee engagement

## Creative employee engagement

- In 2016, we tested the employee innovation management system through a pilot edition of the 'Turn an Idea into Reality' competition.
- In 2016 and 2017, 194 innovative projects were submitted in the competition to improve the operating efficiency of various areas in the three companies: LOTOS Asphalt, LOTOS Oil, and LOTOS Petrobaltic.

### Innovative employees – the 'Turn an Idea into Reality' competition

The purpose of the competition, launched in 2016, is to creatively engage the employees and use their innovative potential. In 2016 and 2017 (as at July 2017) the competition was entered by LOTOS Asphalt, LOTOS Oil, and LOTOS Petrobaltic employees, who worked on their projects either in teams or individually.

Summary of the projects at the three companies: most of the projects related to improvements in **production (59)**, then **trading (29)**, and finally **logistics (22)**. Most of the projects were submitted by employees of LOTOS Asphalt (77).

The 'Turn an Idea into Reality' competition is based on the following assumptions:

- The submitted projects should be capable of being implemented in the future and should bring measurable economic benefits to the company,
- The competition is run in a transparent manner, its rules are known and clear to all the participants,
- Award-winning improvement projects will be implemented at the LOTOS Group.

### Summary of the competition results at individual companies:

#### Innovative ideas put forward by LOTOS Asphalt employees

In 2016, a pilot edition of the competition was run at LOTOS Asphalt as part of a project to test the innovation management system at the LOTOS Group.

- The competition jury received **77 submissions**, presenting ideas on how to enhance processes in various areas of the organisation. Most of the projects related to **production (19) and logistics (14)**. There were also projects pertaining to the IT (8), administration (7), or HR (6) areas.
- **47 employees**, that is more than **20% of the company's total headcount**, signed up for the competition.

- The winning project, aimed at optimising bitumen production, was **'Improving the Efficiency of Bitumen Modification with Polymers in the Process Units'**. The second place was awarded to the design of an application for road designers and building inspection offices, which can be used for verifying the credibility of trading partners, and the third – to a project entitled 'Bunker Receipt Generated Automatically by the SAP System'.
- The winners were given cash prizes from PLN 3,000 to PLN 10,000. Additionally, eight distinctions were awarded, and each of the distinguished participants received PLN 1,000.

### Innovative ideas put forward by LOTOS Oil employees

- The competition jury received **69 innovative projects**, including 52 individual and 17 team submissions.
- The competition was entered by 43 LOTOS Oil employees (33 men and 10 women, representing **over 15% of the company's total workforce**), of whom 25 work in Czechowice and 14 in Gdańsk.
- The winning project was **'Manufacturing and Sale of Process Oils'**. It envisages manufacturing of process oils from raw materials available at the LOTOS Group. The oils will be used in rubber and tyre manufacturing and in related industries. The second place was awarded to a project related to the trade area, and the third – to a project from the logistics area, entitled 'Flexes to the Tracks'.

### Innovative ideas put forward by LOTOS Petrobaltic and SPV Baltic employees

- The competition was held at the company in the first half of 2017. **48 projects were submitted in total**, including 40 from individuals, and 8 from teams.
- The competition was entered by a total of **35 employees of LOTOS Petrobaltic** (9 women and 26 men), which represents almost **9% of the LOTOS Petrobaltic Group's** entire workforce.
- The winning individual project was **'Purchase and Installation of a Container Steam Boiler House Adapted to Be Fed with Separated Gas from the B8 Field'**. The second place was won by a project entitled 'Use of Gasoline Separator to Separate Natural Gasoline from Gas Burnt in Outboard Flares', and the third by 'Migration and Integration of Platform Warehouses and Deposits from the Onshore Base to the SAP System'. The winners were given cash prizes.
- **All the award-winning projects will be implemented and will bring measurable economic benefits to the companies.**

Company name	Number of projects	Active innovators as % of workforce
LOTOS Asfalt	77	19,5
LOTOS Oil	69	14,7
LOTOS Petrobaltic	48	9
<b>Areas</b>		
Trade	29	
Refining	57	
Exploration	2	

<b>Company name</b>	<b>Number of projects</b>	<b>Active innovators as % of workforce</b>
Drilling	2	
Logistics	22	
Finance	3	
IT	15	
Administration	16	
Marketing	11	
HR	10	
Other*	27	

\* OHS, training/certifications, development, procurement, employee integration, business practices and public relations, work organisation, communication.

Readiness to embrace innovation > Trading and other partners

## Trading and other partners

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In 2016, we implemented projects extending beyond the refining business, working with research centres, the manufacturing industry and local governments. We actively seek partnerships that allow us to build innovation and technological advantage over competitors.

### Smart specialisation partnerships

LOTOS Group companies are active participants in two out of four research and development areas of the **Pomerania Smart Specialisation (ISP) project**.

- Grupa LOTOS, LOTOS Lab, LOTOS Asphalt, LOTOS Oil and LOTOS Petrobaltic have been included in the 'Eco-Efficient Technologies for the Production, Transmission, Distribution and Consumption of Fuels and Energy and for Construction' area or **ISP3**.
- In parallel, LOTOS Petrobaltic participates in 'Offshore, Port and Logistics Technologies' or **ISP1**, which covers floating and stationary structural components of offshore wind farms and **production platforms**, unmanned marine, land and air vehicles for monitoring and inspection of offshore facilities, as well as systems for **removal of petroleum contamination from water and environmental monitoring systems**.



What **Smart Specialisation** means in practice is that public funds within the EU will be spent to unlock and harness the potential of the areas (**like Pomerania**) and sectors (**like extractive industries**) which stand out in a given region in terms of **significant potential for rapid growth** and international expansion.

The ISP programme assumes that its participating projects, which now include the research initiatives of LOTOS Group companies, will have **easier access to funding** under the 2014–2020 Regional Operational Programme for the Gdańsk region, Smart Growth Operational Programme, and HORIZON 2020. Thanks to involvement in the ISP project, we established **collaborative relationships with the Marshal Office of the Gdańsk region and the academic community**.

## We support start-ups – working with start-up incubators

Our subsidiary LOTOS Paliwa has teamed up with the Academic Business Incubators to support new business ventures. The initiative helps new businesses to reduce operating costs.

Our partner start-ups are offered **lower fuel prices** and discounts on products and services purchased at LOTOS service stations. Last year **2,200 early stage companies housed in 50 incubators** were given attractive fuel discounts. By forging relationships with businesses at an early stage, we lay the foundations for long-term collaboration.

A special edition of the LOTOS Biznes fleet card for businesses participating in the Academic Business Incubators programme provides them with an option to continue the business relationship with us and use fuel discounts even after they leave the incubator. Micro-enterprises and small businesses are an increasingly important customer group at our service stations.

## DIRECTION: THE FUTURE – OUR RESEARCH PROJECTS

Readiness to embrace innovation > Direction: the future – our research projects >  
LOTOS here and now – hydrogen, CNG/LNG

### LOTOS here and now – hydrogen, CNG/LNG

#### New LNG reloading terminal on the TEN-T map

At the LOTOS Group we deliver projects co-funded by the EU that enable us to develop and implement innovative technologies and logistics solutions. One of them is **a project to construct a small-scale LNG terminal in Gdańsk** to operate as a local hub for transshipment, bunkering and distribution of LNG to end users and service stations.

The feasibility study of the project was awarded EU funding in the CEF-Synergy competition.

The initiative is related to the project to expand reload capacity at the LNG terminal **in Świnoujście** from 5 bcm to 7.5 bcm of LNG annually. The LNG hub in Gdańsk, combined with the capacity of the Świnoujście terminal, **will enable development of the local LNG market in Poland.**

**The LNG hub** in the Port of Gdańsk will bring the following benefits:

- It will provide infrastructure to use LNG as a marine fuel at TEN-T ports in Gdańsk, Gdynia and Sopot,

**> TEN-T stands for the Trans-European Transport Network** and ensures interconnectivity of infrastructure projects across the EU. It is the backbone for transport in Europe on which the EU will focus to enhance cross-border connections, **fill missing links and remove bottlenecks.**

- It will prompt construction of local LNG storage infrastructure enabling LNG to be used as an energy source (in refineries or ships moored in ports) or as fuel for marine and land transport **along the TEN-T Baltic Sea-Adriatic Sea corridor,**
- It provides an option to connect LNG storage facilities to the high-pressure gas network of the LOTOS refinery,
- It will prompt construction of infrastructure for distribution of LNG to heat and power plants in **regions unserved by the gas pipeline network in north-eastern Poland.**

## Hydrogen as an energy source – HESTOR

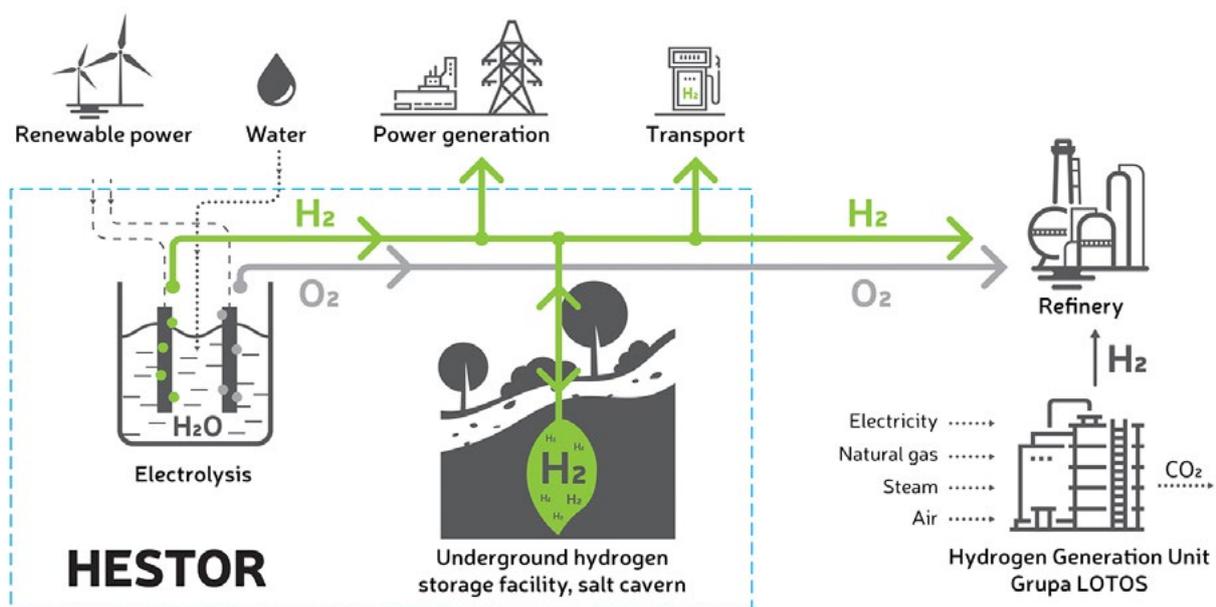
→ At the LOTOS Group we are analysing the efficiency of storing hydrogen obtained from surplus renewable energy.

The research project combines environmental protection with innovation and aims to **develop a technology for storing hydrogen as an energy carrier**. Grupa LOTOS is the leader of the project consortium comprising AGH University of Science and Technology in Kraków, Silesian University of Technology, Warsaw University of Technology, CHEMKOP and GAZ-SYSTEM.

The purpose of the project is to **investigate the efficiency of salt-cavern storage** of hydrogen produced from excess wind and solar power through electrolysis. Hydrogen obtained in this way could be used in technological processes at the **refinery** and for electricity generation in gas turbines. If successful, the project could lead to a substantial reduction in CO<sub>2</sub> emissions.

> The central element of HESTOR is generation of **hydrogen from excess renewable energy** and directing it to refining processes or for storage in salt caverns.

> One of the scenarios contemplated by the HESTOR project is using hydrogen to **power fuel cell vehicles in urban agglomerations**, including public transport vehicles, at hydrogen compression and refuelling stations, to cut exhaust emission levels in cities.



The HESTOR project, or underground caverns for storing surplus electricity in the form of hydrogen, will deliver the following environmental benefits over ten to twenty years:

- Solution for storing and recovering surplus energy in an environmentally-friendly way with no additional emissions generated, as hydrogen is the cleanest energy carrier,
- Environmental safety of underground energy storage facilities, similar to that of existing underground gas, oil and fuel storage facilities,
- Higher efficiency and environmental safety of underground storage relative to hydro power plants,
- Better use (in technical and economic terms) of periodic energy excess from power plants and combined heat and power plants, resulting in a substantial reduction of CO<sub>2</sub> emissions,
- Easier integration of large wind and solar farms into the power system,
- Reduced combustion of conventional fossil fuels,
- Advancement of fuel cell vehicles and reduction of exhaust emissions,
- Possibility of utilising carbon dioxide by using hydrogen in methane production.

[Readiness to embrace innovation](#) > [Direction: the future – our research projects](#) >  
 LOTOS Energy Hub – modern refuelling

## LOTOS Energy Hub – modern refuelling

Our concept of LOTOS Energy Hub is an extension of the HESTOR project and the new LNG hub in the Port of Gdańsk. The project envisages the rollout of modern multi-energy service stations **that would enable the refuelling of vehicles** with conventional and alternative fuels **like LNG, CNG, hydrogen and electric energy**.

### More information

[Directors' Report on the operations of Grupa LOTOS S.A. and the LOTOS Group in 2016](#)

Chapter 2.2. Status of key development projects in 2016 (in terms of subtitle „Innovation and development projects”)